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AUTHOR Muscella, Deborah
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ABSTRACT

The central theme of this paper is that multimethod, multitrait research is essential to uncover learning beliefs and learning structures. The year-long social-ecological study clearly illustrated the efficacy of such a research process. This was a study of the elements of a kindergarten classroom environment and the beliefs that parents, teachers, and children had about school learning. A comparison was made of the beliefs and participation of Hispanic and Anglo children from low and middle income families. A person-environment interaction model provided the conceptual framework and shaped the multi-operational research strategies. Results indicated that parents, teachers, and children had different beliefs about classroom learning events, with parents shaping portions of both children's and teachers' beliefs. All children were preoccupied with rules and procedures for learning activities, especially low achievers. Achievers and low achievers differed markedly in the importance they attributed to learning events. Both low income and low-achieving students preferred cooperative learning activities. The discrepancies between learning beliefs and learning events were greater for Hispanic, low achieving, and low income students. Multiple operations analyses were instrumental in specifying the discordance between beliefs and the classroom teaching-learning structure. (MDE)

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UNCOVERING BELIEFS ABOUT LEARNING: MULTIMETHOD, MULTITRAIT RESEARCH

DEBORAH MUSCELLA
THE UNIVERSITY OF TEXAS AT AUSTIN

PAPER PRESENTED AT THE ANNUAL MEETING OF THE
AMERICAN EDUCATIONAL RESEARCH ASSOCIATION

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Uncovering Beliefs about Learning: Multimethod-Multitrait Research

Deborah Muscella
The University of Texas at Austin

The central theme of this paper is that multimethod, multitrait research is essential to uncover learning beliefs and learning structures. This thesis emerges from the results of a year-long, social-ecological study of the beliefs which kindergarten children and their parents and teachers had about school learning and the classroom learning events themselves. The strategy adopted in this research is characterized as an iterative, empirical approach which takes an inductive-deductive form and uses a multiplicity of operations and analysis (Campbell & Fiske, 1959; Cook & Campbell, 1979; Pelto & Pelto, 1978). In such an approach, a broad set of generalizations and general hypotheses is posed, the important variables are constructed into a conceptual model, and following empirical observations, the hypotheses are revised, another set of observations made, and new questions and procedures generated (Narroll & Cohen, 1970). The data accumulated during the iterative process eventually refine the conceptual framework (Denzin, 1970).

Two factors were key in discovering the participant belief patterns and the classroom teaching-learning paradigm. The conceptual model framed the research questions, operations, and analyses of the research and the iterations prompted a cycle of inductive-deductive processes. This conceptual framework, a person<->environment interaction model, incorporated learning beliefs, the learning environment, cognitive dissonance, and learning and achievement as components and guided the research from the pilot study through the final analyses (Figure 1). It was through this iterative, empirical research process that the utility of the conceptual model was increased. This became patently evident when the model component, cognitive dissonance, was considered.

Dissonance played a pivotal role in the final development of the person<->environment interaction model; however, this was not readily apparent until the multiple analyses of both the classroom situation and participant beliefs had been compared. Beliefs about learning were complex, conflicting, and inconsistent for each of the participant groups. These inconsistencies were quite

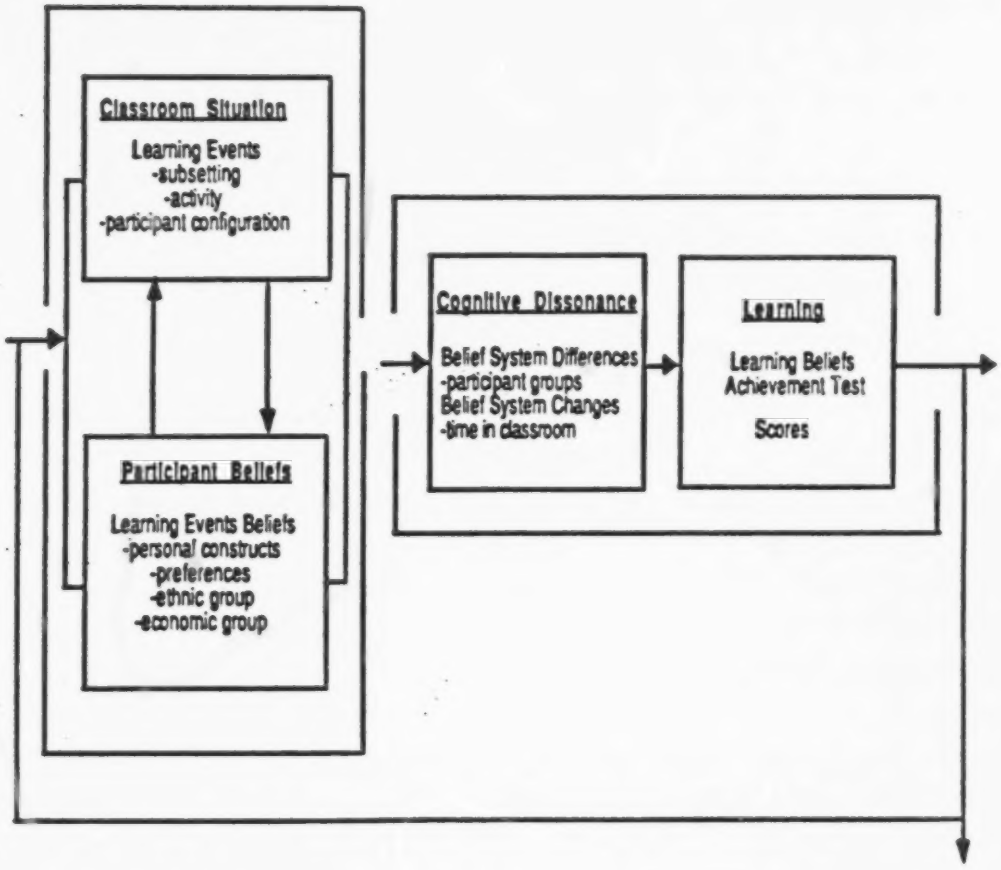

Figure 1. A person<->environment interaction model.

expected as it is customary to find discrepancies in the belief systems of any individual (Kelly, 1955). However, the learning beliefs of several of the participant groups, such as the low income, Hispanic, and low achieving children, were in greater conflict with the classroom teaching-learning structures than were the beliefs of other children. Since persistent discordance between learning beliefs and the classroom environment often impact school achievement, uncovering how children resolved the discrepancies they experienced between their learning beliefs and learning events assumed a critical role in this research (Festinger, 1959; Labov, 1972; McDermott, 1974; Sameroff, 1979). It was precisely the empirical, iterative process that indicated the centrality of cognitive dissonance in documenting the interactive nature of learning beliefs and learning events. Dissonance served as a mediator for the learning beliefs and learning events; that is, cognitive dissonance explained the vehicles which were available for children to resolve the discrepancies between their beliefs and teaching-learning structures.

Synopsis of the Research

This paper focuses on those aspects of the longitudinal, social-ecolgical study which clearly demonstrate the efficacy of a multimethod, multitrait research process. Briefly, the research was a study of the elements of a kindergarten classroom environment and the beliefs which parents, teachers, and children had about school learning. An important focus of this research was a comparison of the beleifs and participation of Hispanic and Anglo children from low and middle income families. The person<->environment interaction model, which was based on the theories of Urie Bronfenbrenner (1979) and Rudy Moos (1979) provided the conceptual framework and shaped the multi-operational research strategies. During individual interview tasks the participants described, grouped, rated, and ranked black and white pen and ink drawings of classroom learning events. The beliefs of the various participant groups were profiled by developing a typology of personal constructs and finding the saliency of these learning events through multidimensional scaling, a linear regression on the multidimensional scaling solution, and conjoint analysis. Photographs of classroom learning events and observations of these events throughout the school year uncovered the primary teaching-learning structure in the classroom. The teaching-learning paradigm of the classroom--one in which teachers directed instruction to large groups and children practiced academic tasks by themselves--was then compared to the participant belief profiles.

The results of this study indicated a discrepancy between the teaching-learning structure and the learning beliefs of Hispanic, low income, and low-achieving children. The Anglo and middle income children and their parents shared some preferences for learning events with both the teachers and Hispanic, low income, and low achieving children. What was particularly intriguing about these latter groups was their particular preference for learning events. Each of these groups preferred cooperative learning activities such as learning centers or teacher-direction in small groups. However, these learning structures were largely unavailable in the classroom. Clearly the discrepancies between learning beliefs and learning events were greater for Hispanic, low-achieving, and low-income students. The persistance of such dissonance may have delimited the academic information which children acquired. The multiple operations and analyses were instrumental in specifying the discordance between beliefs and and the classroom teaching-learning structure.

The Participants and the Setting

The many attributes included in the study of the learning environment and the learning beliefs of diverse participant groups required comparisons of several economic and ethnic groups, assessments of beliefs over time, and focused, long-term classroom observations. This school which participated in the were located in the central Texas area (the names of these schools have been changed to protect the identies of the participants). A broad sample of Hispanic and Anglo kindergarten children from varying economic groups provided information about the beliefs of these diverse groups. A smaller, intensive sample furnished the particulars about the learning beliefs of the parents, teachers, and children, changes in their beliefs over time, and the classroom learning environment. Kindergarten classrooms in the Jones, Smith and Northside schools comprised the broader sample. Each of these settings represented different economic levels but had proportionate numbers of Hispanic and Anglo children. The Jones school represented lower socioeconomic groups, Smith drew from lower, middle income families, and Northside was an upper middle-class school. Table 1 shows the gender and racial composition of the students from these schools. Children from these three schools were interviewed during the spring semester of the study, and their belief profiles of these children then served as a comparative base for the smaller intensive sample.

The team-taught kindergarten class in the Jones school, which drew from low economic Hispanic and Anglo families, served as the intensive sample. The two

Table 1
Gender and Ethnicity of Participants

	Number of Students		
	Hispanic	Anglo	Black
Jones School			
Boys	2	3	-
Girls	1	2	-
Northside school			
Boys	2	2	-
Girls	2	1	1
Smith school			
Boys	6	4	-
Girls	2	4	-
Total	15	16	1

Anglo teachers who each had ten years of teaching experience, nine parents and their eight kindergarten children particpated in the study. These eight childen represented varying academic achievement levels. Eight of the parents were mothers, with three of them heading single parent families with their kindergarten chil as an only child. The remaining five children lived in two parent families with one or two siblings. In only one tow-parent family did the father participate in the interview. The eight children of these parents represented varying achievement levels. Parents, teachers, and children were interviewed during the fall semester and teachers and children were interviewed again during the spring. Observations of classroom learning events occurred throughout the school year.

It is the Jones classroom and its participants which is the primary focus of this paper. An important adjuct to this discussion are the beleifs of the eighteen achieving and fourteen low achieving children from the Jones, Smith, and Northide schools. When the nuances of learning beliefs and the classroom environment are explored with particular reference to participants, the following statements capture the salient findings and pivot the discussion of multimethod, multitrait research.

- Teachers believed that teacher-directed instructional groups were required for teaching and learning in school.
- The primary task and participant structures in the classroom reflected the teachers' beliefs in that large group teacher-directed instruction followed by students practicing academic tasks alone was the teaching-learning paradigm of the clasroom.
- Parents, teachers, and children had different beliefs about classroom learning events with parents sharing portions of both the teachers' and children's beliefs.
- Children had an expansive view of work and play activities, but the adult's view was dichotomous.
- All children were preoccupied with the rules and procedures of learning activities, and this was even more pronounced for low-achieving children.
- Achieving and low-achieving children differed markedly in the importance which they attributed to learning events.

A Schematic of the Operations and Analyses

Because of the many and varied research strategies, a schematic of the operations and analyses with reference to the components of the conceptual model provides a working framework for this research (Figures 2 and 3). Briefly, the study included a series of assessments of classroom learning events and participants beliefs about these events. Classroom learning events were assessed through the teacher workplan, an array of learning events photographs, and focused observations of learning events. The teacher workplan denoted the type, nature, frequency, and durations of learning events which were then verified through 250 learning events photographs taken in two representative kindergartens. Focused observations of selected teacher and child-directed learning events further enhanced and verified these documented learning events. From these data a teaching-learning framework was uncovered which indicated the primary participant and task structures which guided classroom learning events. When this framework was used to re-evaluate the classroom learning events taxonomy, the characteristic features of the teaching-learning paradigm emerged. The teaching-learning enterprise was primarily that of teacher-directed instruction followed by individual students practicing academic skills alone. This paradigm were then used to consider discrepancies between participant beliefs and the classroom situation.

The teacher workplan, the photographic array of classroom learning events, and the taxonomy of classroom events also were used to develop instruments and tasks to assess beliefs. Two sets of black and white artist's renderings of classroom learning events were presented to participants during individual interviews. The pictorial stimuli, a stratified sample of classroom learning events derived from the 250 photographs, depicted various teacher and child-directed learning events. A second set of nine pictorial stimuli, derived from an orthogonal array of all possible combinations of the three defined dimensions of the classroom learning environment, showed various configurations of activity types, group configurations, and classroom subsettings (Figure 5) (Alpert, et al., 1978). A third instrument, a game board rating matrix, included descriptors of classroom learning events and learning events scenes.

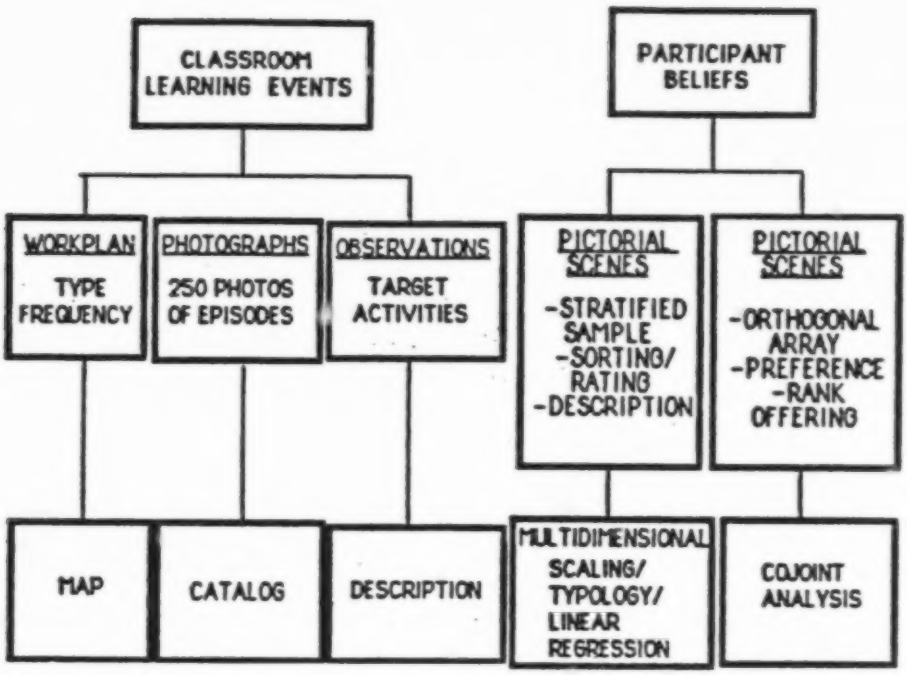

Figure 2. Operational and analysis scheme for the classroom learning events and participant beliefs model components.

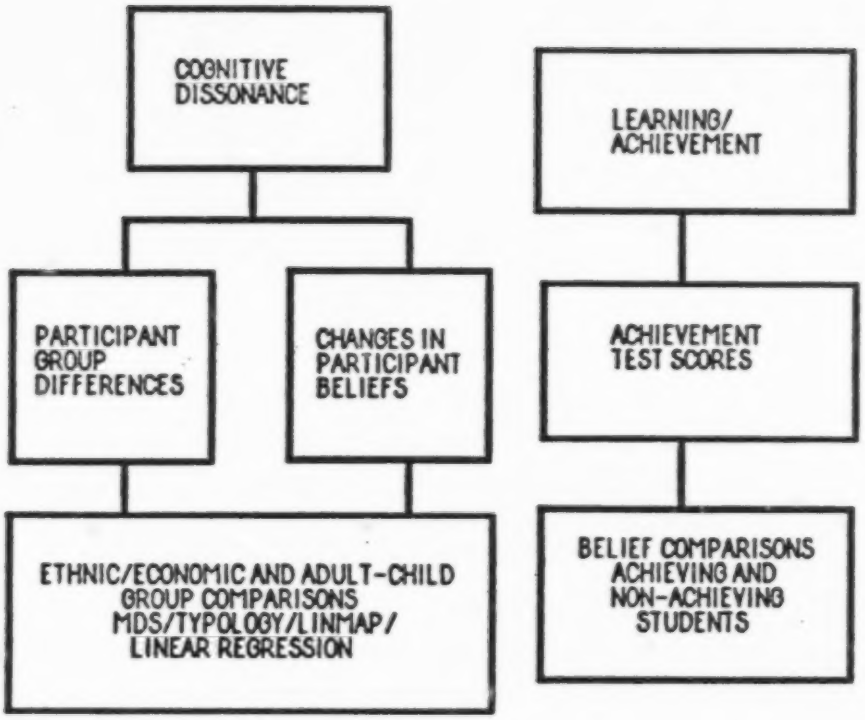
COGNITIVE DISSONANCE
LEARNING/ ACHIEVEMENT
PARTICIPANT GROUP DIFFERENCES
CHANGES IN PARTICIPANT BELIEFS
ACHIEVEMENT TEST SCORES
ETHNIC/ECONOMIC AND ADULT-CHILD GROUP COMPARISONS MDS/TYPOLOGY/LINMAP/ LINEAR REGRESSION
BELIEF COMPARISONS ACHIEVING AND NON-ACHIEVING STUDENTS

Figure 3. Operational and analysis scheme for the cognitive dissonance and learning and achievement model components.

Figure 4 Personal construct elicitation pictorial stimuli.

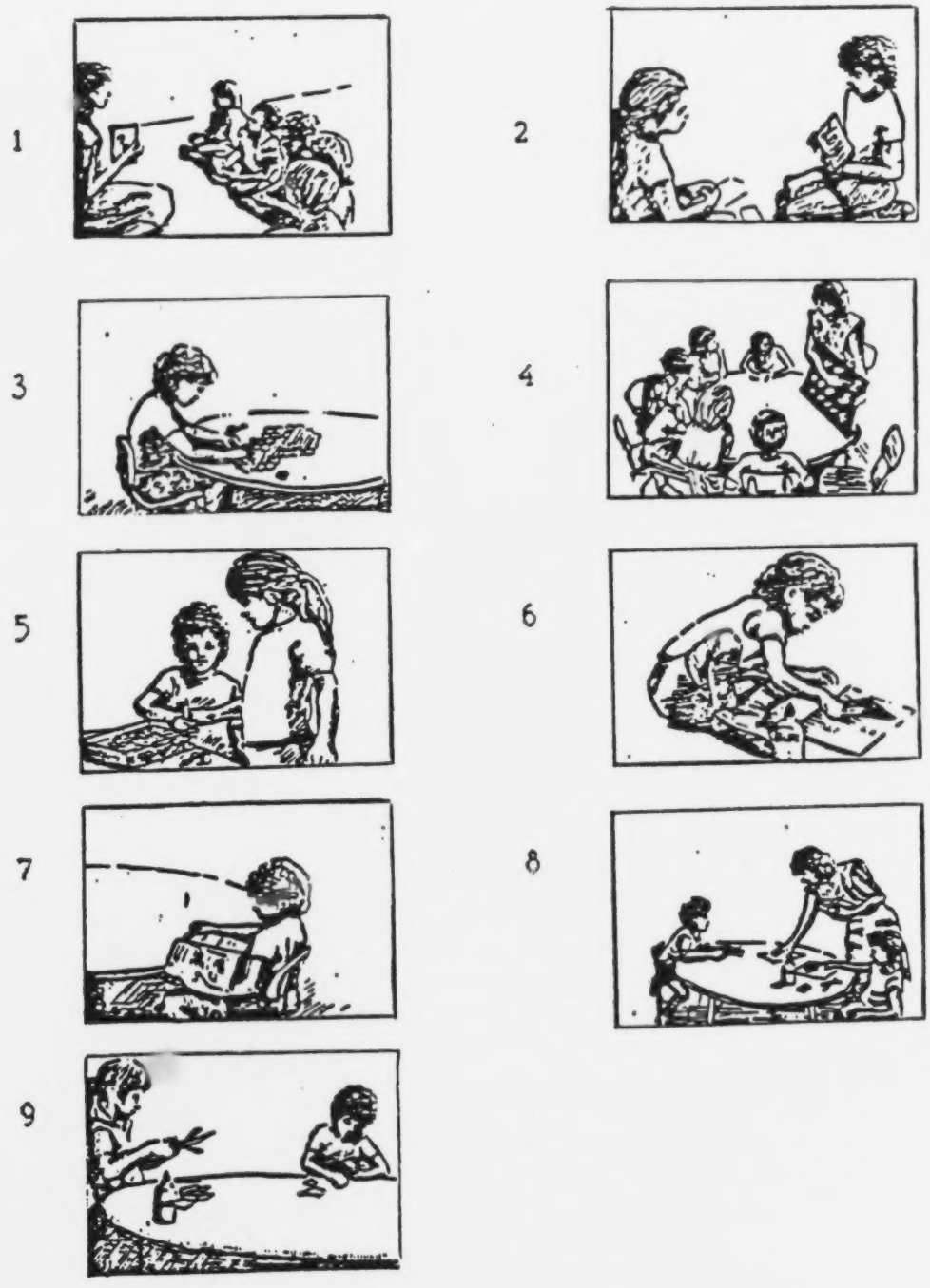

Figure 5. Orthogonal array of classroom learning events scenes.

FUN	10	9	5.5	1
LEARNING	2	9	10	1
HARD	2	1	10	5.5
PLAYING				
BORING				
TEACHING				

Figure 6. Game board rating matrix.

Participants grouped, rated, ranked, and described these sets of pictorial stimuli. The belief patterns of the various adult and child participant groups were uncovered through a typology of personal constructs, multidimensional scaling, linear regression, and conjoint analysis. The typology of personal constructs indicated that both adults and children considered the classroom learning events as complex activities. Five construct types-- *learning activities, group structure, task structure, task outcome,* and *location*--were discovered through the typological analysis, and most of these types had several subcategories (Table 2).

A two dimensional solution was derived for each participant group when the multidimensional scaling INDSCAL analysis was computed. Generally these dimensions were interpreted as *participant configuration* and *learning activities*, but these dimensions had differential importance for the various participant groups. A linear regression procedure enhanced the interpretation of the INDSCAL solution (Kruskal & Wish, 1978). The ratings which the participants assigned to classroom learning events were averaged and regressed over the two derived dimensions of the multidimensional scaling solution. The cosines of these derived regressions of the rating scales were calculated and the resulting vectors were plotted through the two derived INDSCAL dimensions. Conjoint analysis provided an assessment of the the participants' preferences for the combined effect of attributes of classroom learning events. Linear programming techniques for multivariate analysis of preferences (LINMAP) indicated that each of the groups ascribed different importance to learning events attributes, and children's preferences became more like those promoted by a structured academic learning environment during the second semester (Shocker & Srinivasan, 1978).

Cognitive dissonance and learning and achievement were evaluated by considering both participant group belief differences and changes in the Jones children and teachers learning beliefs throughout the school year. Belief differences were found among economic and ethnic groups, and these differences suggest that lower socioeconomic and Hispanic children experienced more discordance between their beliefs about learning and classroom occurrences. When the beliefs of the teachers and children were compared in the fall and spring semesters, achieving children had adopted beliefs which were much like those of their teachers by the second semester. These changes in belief patterns suggest that achieving children resolved the dissonance they had originally experienced by adopting the mainstream beliefs of the classroom. However, low-achieving students continued

to prefer small group structures and discovery learning activities. As these learning structures were largely unavailable in the classroom, it is very likely that the low achieving children experienced dissonance throughout the school year.

Patterns of Learning Beliefs

Personal construct theory, a clinical procedure effective in eliciting beliefs from both adults and children was adapted to interview parents, teachers, and children about their learning beliefs (Kelly, 1955; Bannister & Maier, 1968). The personal construct interview tasks required the respondents to group, rate, and rank ten black and white artist's renderings of classroom learning events scenes during a thirty minute interview (Figures 4, 5, 6) (Fransella & Bannister, 1977). Frequency of co-occurrences matrices, ratings, rank-ordered data, and personal constrcuts were then submitted to multidimensional scaling, conjoint analysis, a linear regression procedure on the multidimensional scaling solution, and a typological analysis of the personal constructs. When the analyses were considered separately, the belief systems were myopic, but when the analyses were jointly assessed, the belief patterns achieved clarity.

Parents, Teachers, and Children

The Individual Differences Scaling model (INDSCAL), a multidimensional scaling procedure, provided the first glimpse of the beliefs which parents, teachers, and children had about learning (Carroll & Chang, 1972; Young, Takane, & Lewyckyj, 1978). The INDSCAL solution configured the classroom learning events around two axes, *learning activities* and *participant configuration* (Figure 7). *Learning activities* were either teacher or child-directed and the *participant configuration* was either a small or a large group. Parents and teachers were closely aligned in the importance which they attributed to teacher-directed *learning activities*; whereas, large group outdoor play scenes on the axis labeled *participant configuration* had high saliency for children (Figure 8). One might make the tacit assumption that children had not yet become socialized in the world of school work which their parents and teachers valued. However, the linear regression procedure, the LINMAP analysis, and the typology of personal constructs pointed to many differences among the participant groups' beliefs. Further, these analyses indicated that belief patterns were much more complex than the multidimensional scaling solution suggested.

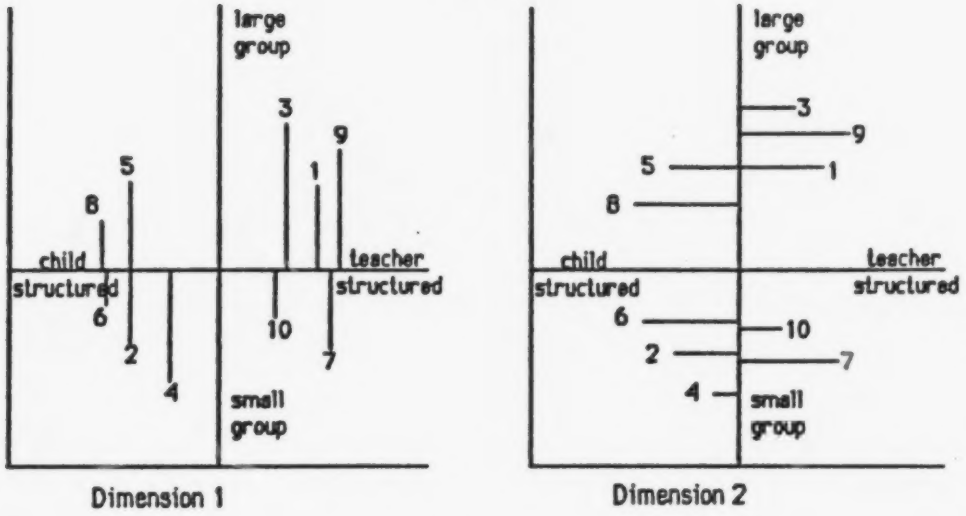

Figure 7. INDSCAL dimensions for Jones parents, teachers, and children.

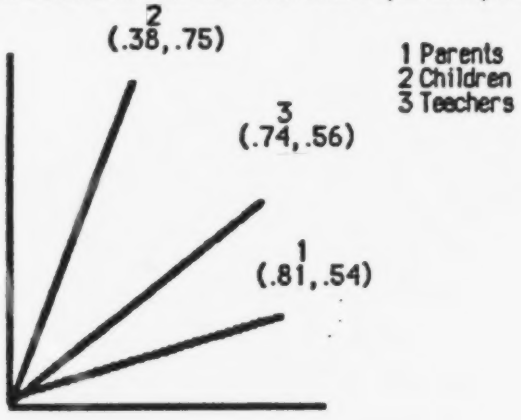

Figure 8. INDSCAL salience weights for parents, teachers, and children.

A linear regression procedure on the multidimensional scaling solution offers ancilliary information about the participants' learning beliefs. Parents, teachers, and children rated the supplied constructs with the pictorial scenes of classroom learning events (Figure 6). When these ratings were regressed over the derived INDSCAL dimensions, four of the scales could be fitted into the configuration (Kruskal & Wish, 1978). When parents' ratings of hard and boring were plotted on the configuration, the vectors were surrounded by teacher-directed

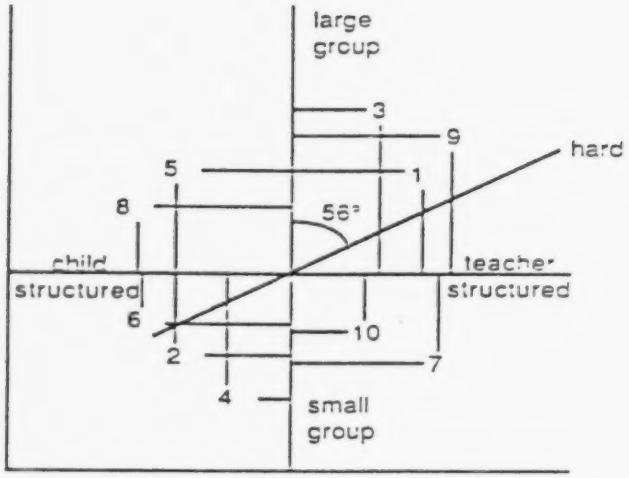

Figure 9. Linear regression of parents' rating scale hard on INDSCAL solution for Jones parents, teachers, and children.

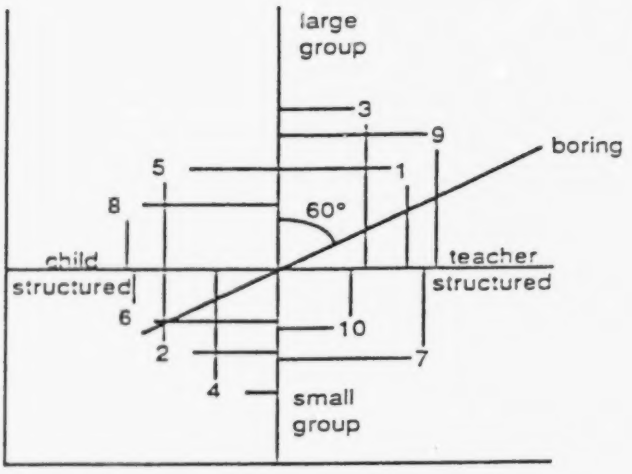

Figure 10. Linear regression of parents' rating scale boring on INDSCAL solution for Jones parents, teachers, and children.

scenes suggesting that parents believed that their children had difficulty adapting to the unitary teaching-learning structure of teacher-directed instruction (Figures 9 and 10). This may have created conflict for the parents: they believed that academic success required their children to follow the existing classroom rules and procedures, but they may have preferred that a larger repertoire of structures be available for learning.

Teachers did not seem to share the parents' conflict, and in fact, teachers appeared to have a dichotomous view of the teaching learning structure. Intersecting the outdoor play and individual child learning scenes was the teachers' fun property vector (Figure 11). This vector intersected work and play scenes. More specifically, on one pole of the axis were the outdoor play scenes in which children played freely; whereas, the other axis pole configured scenes of children working alone on academic tasks. One interpretation is that fun could occur while children played outdoors, but instructional tasks were school work. Children, however, had a more expansive view of work and play. The children's rating scale, learning, was plotted through both teacher-directed activities and learning center tasks (Figure 12). It may well be that children consider a variety of learning center and teacher-directed activities as learning.

Certainly the linear regression procedure suggests that parents, teachers, and children construed learning events differently, and parents seem to experience the greatest amount of belief conflict. However, the difference between the teachers' and children's beliefs suggests a discrepancy between beliefs and learning. Since the teachers, who structure the classroom learning events, had strong preferences for teacher-directed instruction, children's preferences for child-directed learning structures were most likely not available in the classroom. Later descriptions of the analyses suggest that these discrepancies created dissonance for the children and may have curtailed their learning.

Conjoint analysis lends further support to the interpretation of the linear regression analysis. The joint effect of the attributes of learning events--participant configuration, subsetting, and activity--which parents, teachers, and children considered important were evaluated through LINMAP, a linear programming technique for multidimensional analysis of preference judgments (Shocker & Srinivasan, 1978). The index of fit and Kendall's tau values had only modest fit or relationship among the rankings of the pictorial scenes (Table 2 and 3). Although

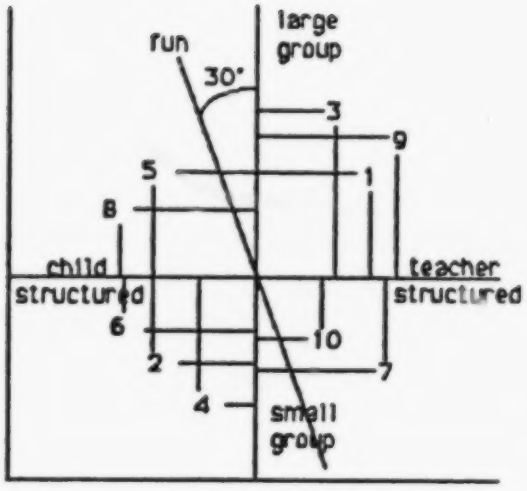

Figure 11. Linear regression of teachers' rating fun on INDSCAL solution for Jones parents, teachers, and children.

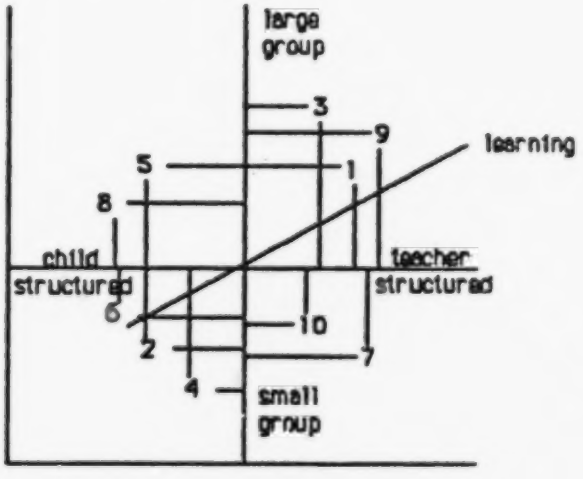

Figure 12. Linear regression of childre's rating learning on the INDSCAL solution for Jones parents, teachers, and children.

this warrants a conservative interpretation of LINMAP, the analysis points out further discrepancies among the belief patterns of parents, teachers, and children.

The LINMAP analysis suggests that parents and children considered activities which allowed exploration and discovery to be important attributes of the learning environment. Teachers, however, in the fall semester comparison considered large group instruction as the salient attribute. Children seemed to have been influenced by the teaching-learning structure in the classroom as individual children practicing tasks were an important learning attributes by the spring semester. Teachers, however, altered their views by the spring; that is, exploratory activities assumed more importance than directed teaching. No evidence, however, was found in the analysis of the classroom situation to suggest that teachers adopted a discovery learning approach; thus, it may be that teachers considered directed teaching and individual practice tasks as independent, exploratory activities.

A typology of personal constructs was most instructive in interpreting the INDSCAL, LINMAP, and linear regression analyses and was instrumental in identifying the belief patterns of the various participant groups. The development of the typology was a comparison of classroom learning events pictorial scenes and learning belief constructs. The typology of personal constructs was considered in two ways: the constructs were classified with reference to the pictorial scenes and as separate entities. A complex classification of five constructs emerged and four of these construct types had several categories (Table 4). Parents, teachers, and children differed considerably in the way they construed the *learning activities*, *group structure*, *task structure*, *task outcome*, which occurred in the classroom.

Parents had considerable diversity and complexity in their construals of classroom learning events which the teachers did not share. At first glance it seems counterintuitive that the parents' constructs would be more diverse than those of the teachers. It would seem more likely that the teachers, who plan several types of learning activities with variations in group structure and learning objectives, would have attended to these variations in the pictorial representation of learning events. In this instance it may well be that because teachers are accountable for the specific skills which they impart to students they perceive classroom teaching and learning as a circumscribed enterprise. As evidence for this hypothesis, when teachers considered group structure, they selected those scenes representative of the typical structure used to impart skills--direct teacher

Table 2

LINMAP Analysis for Jones Parents, Teachers, and Children in Fall Semester

	Goodness of Fit		
	Parents	Teachers	Children
Kendall's tau	.222	.361	.194
C*	.412	.286	.641

	Attribute Importance (AI)	Participant Configuration (PC)	Subsetting (S)	Activity (A)
Parents				
PC	0.0	0.0	0.0	0.0
S	0.1	.67	.33	.33
A	0.0	0.0	0.0	0.0
Teachers				
PC	0.1	.66	.33	.33
S	0.0	0.0	0.0	0.0
A	0.0	0.0	0.0	0.0
Children				
PC	0.0	0.0	0.0	0.0
S	0.1	.66	.33	.33
A	0.0	0.0	0.0	0.0

Note. Numerous ties were found in the rank order data.

Table 3

LINMAP Attribute Importance for Jones Teachers and Children in the Fall and Spring Semesters

	Attribute Importance (AI)	Participant Configuration (PC)	Subsetting (S)	Activity (A)
Teachers/Fall				
PC	0.1	.67	.33	.33
S	0.0	0.0	0.0	0.0
A	0.0	0.0	0.0	0.0
Children/Fall				
PC	0.0	0.O	0.0	0.0
S	0.1	.66	.33	.33
A	0.0	0.0	0.0	0.0
Teachers/Spring				
PC	0.0	0.0	0.0	0.0
S	0.1	.67	.33	.33
A	0.0	0.0	0.0	0.0
Children/Spring				
PC	0.1	.33	.33	.66
S	0.0	0.0	0.0	0.0
A	0.0	0.0	0.0	0.0

instruction followed by individual skill practice. Further, teachers gave scant notice to those activities which the individual child structured.

Parents, also concerned with skill acquisition, were interested in seeing that their children acquire the social skills to get along with others. Support for this speculation is found in the fact that parents considered a variety of groups structures necessary so that children could acquire both academic information and social skills. Further, parents did not consider academic and social skills as mutually exclusive. It may be that parents have witnessed their children learning language, motor, and social skills in a variety of sibling, peer, and individual group structures; therefore, they may have a more encompassing view of ways in which their children learn.

The typology also points to differences between adults and children. One primary difference is the dichotomy between work and play, a construct of the adults which the children did not share. Children had a broad view of learning activities, and they considered many activities as play which their parents and teachers viewed as work. It may be that tasks which connote play for adults are, for children, socially and cognitively complex tasks. Another speculation is that at the beginning of the kindergarten year children have not had enough classroom experience to form definite opinions about school. Adults have a fairly strong belief set about school learning. This explanation probably accounts, in part, for the differences between the adult and the child groups and the fact that children's constructs became more like the adults by the second semester.

A final potent hypothesis regarding differences between the parents, teachers, and children is the construct of rules and procedures. Rules and procedures had saliency for both the parents and the children; however, none of the teachers constructs were typed as <u>rules and procedures</u>. There are several hypotheses for this phenomenon. Since it is the beginning of the kindergarten year, children receive considerable information about the rules and procedures in their classroom which they may then convey to their parents. Teachers, on the other hand, may be more aware of the tasks surrounding the rules rather than the rules themselves. It may also be that teachers are unaware of the frequency with which they deliver rules to children.

Table 4

Description of Construct Types

Construct Type	Description	Representative Constructs
Learning Activity	planned learning events	
learning play	a task without teacher direction	free play center learning writing A's
school tasks	teacher-structured	ABC order activity to teach
doing work	specific skills	reading readiness
construction	design and building objects from free-form materials	making something building a structure
transition	structured change from learning event to another	lining up standing in line
Group Structure	the participant structure for a learning event	
teacher-directed	the teacher structures and directs from several children to the entire class	classroom experience with the teacher small group with the teacher
small groups	a group of children who orchestrate a task	quiet play in small groups children doing things without the teacher
dyads	two children engaged in a task together	learning between two people pairing off to work on a project
individual child	a child engaged in a task alone	individual working without the teacher work in which they go off by themselves

Task Structure	the individual(s) who plan operationalize the form and function of a learning event	
teacher-structured	the teacher is the planner of the learning event	structured learning not at all self-directed teacher giving information
child-structured	a child or children plan the learning event	learning experience on their own self-teaching
unstructured	lack of visible preplanning by any of the classroom participants	not at all structured being able to do what they want without supervision
Task Outcome	the accomplished goal or derived benefit of a learning event	
cognitive	learning which increases such skills as problem solving but is not tied to a specific skill	try to figure something out exploratory mental activity
fun	a task which is mostly pleasurable and in which the participants are viewed as happy	free-spirited doing what feels good children look happy
levels of interaction	the degree of involvement with other participants during a learning activity	playing and sharing interacting with each other
rules and procedures	the parameters for the behavior of the participants to complete tasks or to participate in learning events	raising hands because you want to talk certain rules teacher says to get in a straight line
teaching and learning	the outcome of planned classroom learning events especially academic tasks	learning skills part of teaching and learning
Location	physical space of an event	outside or inside learning

However, since children remained preoccupied with rules throughout the school year, it may well be that understanding and following the rules is given considerable attention in the classroom, and that children have not come to understand the salient norms of the classroom. Children's attention to rules and procedures surrounding learning events may delimit the academic information which they receive. Both this phenomenon and the inter- and intra-group differences in beliefs are suggestive of cognitive dissonance.

Achieving and Low-Achieving Children

It was suspected that the beliefs of achieving and low-achieving children would differ since the extant literature suggests that learning and school achievement are often affected by differences in the belief patterns of students and teachers (Brice-Heath, 1982; Labov, 1972; McDermott, 1974). An important aspect of this study was to learn if the achieving and low-achieving students did perceive classroom learning events differently. The fiftieth percentile of a school-administered standardized achievement test was the demarcation for achieving and low-achieving students: those who scored below this point were considered low-achieving, those above were achievers. The beliefs of 18 achieving and 14 low-achieving students from the Smith, Jones, and Northside schools were profiled. The learning beliefs of the four achieving and four low-achieving Jones children had the same profile as those of the children from the broader three school sample. The beliefs of the Jones children were then evaluated in light of the classroom learning events.

The INDSCAL analysis for achieving and low-achieving children resulted in two dimensions. The first dimension was labeled as *child-directed* and configured learning center and outdoor play scenes on opposite poles (Figure 13). Dimension 2 was labeled *classroom teaching-learning* as individual skill practice anchored one pole and teacher-directed instruction the other. Achieving children differed considerably from low-achieving childen on both dimensions (Figure 14). Achieving children had much greater salience weights for the *classoom-teaching learning* dimension than for the *child-directed* dimension. This pattern was almost reversed for the low-achieving children who had high salience weights on the *child-structured* dimension and low saliency on the *classroom teaching-learning* dimension. Both groups seemed to attribute importance to activities which they could structure or direct in some way. However, the salience weights for these

dimensions suggest that the prominent teaching learning paradigm has more saliency for achieving than low-achieving children.

Differences between achieving and low-achieving children were pronounced in the attention which they gave to rules and procedures and the participant structure of learning tasks. Non-achieving children were much more preoccupied with rules. Further, the rules which low-achieving children cited were those associated with correct behavior, while achieving children made reference to

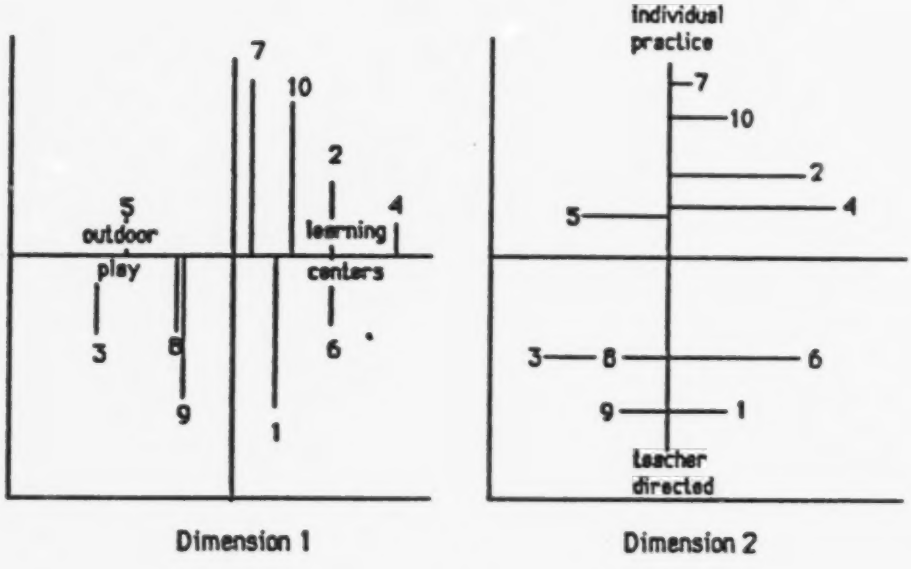

Figure 13. INDSCAL dimensions for achieving and low-achieving children.

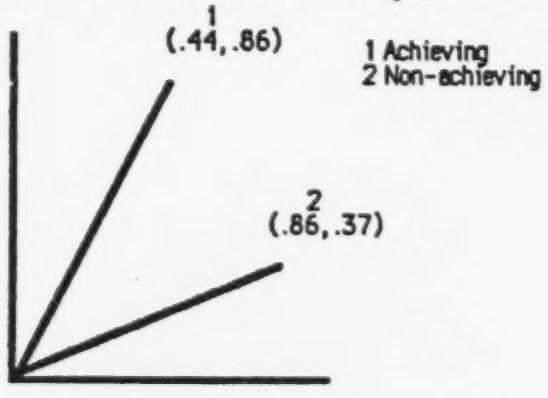

Figure 14. INDSCAL salinece weights for achieving and low-achieving children.

procedures for learning events. Rules and procedures for achievers were represented by the teacher-directed scenes , large group transition, and the individual child building with blocks. They described these as "you hear two bells for a fire drill", and "you're not supposed to play these without a helper", and "she's holding up a number and everyone is raising a hand except one girl." For non-achievers, the most frequently selected scenes for rules and procedures were teacher-directed activities which they described as "everyday they get a star or a sticker"; "they're raising their hands when they want to talk"; "this little boy didn't do his work so he had to start over again."

As discussed previously, it may be that there is a discordance between the students' beliefs and the norms of the classroom which causes low-achieving children to be more preoccupied with rules. The differential importance which these two groups gave to the participant structure supports this notion. Low-achieving children considered child-directed activities as important. This was not, however, the way in which learning events were typically structured. Teaching and learning was primarily a teacher-directed enterprise which achieving children considered as the more important dimension. One might conclude that low-achieving children preferred a teaching-learning dimension which was largely unavailable in the classroom. It might be argued further that this preference was a learning need; that is, learning with another child provided more information than large group instruction. This mismatch may have required that low-achieving children spend more time than achieving children attending to the rules of the classroom. This greater attention to rules may have delimited the academic information which non-achieving children acquired.

Achieving children adopted what might be considered the mainstream views of the classroom. They ascribed importance to school tasks such as reading, writing, and listening with much more frequency than low-achieving children. The important group structure which achieving children considered for these academic tasks was that of an individual working alone. Low-achieving children selected the individual practice tasks with much less frequency than the achieving children. And, perhaps more importantly, the belief patterns of the achieving children mirrored the beliefs of the Jones teachers. The classroom teaching-learning structure supports this contention and gives further evidence of the need to examine beliefs and the environment from multiple vantage points.

Classroom Teaching Learning Paradigm

The primary *participant structure* of the classroom was a dichotomous pattern which was dictated by one *task structure*. Teacher-structured tasks were implemented primarily in two ways; that is, teachers instructed children in groups and then children, working alone, practiced the skills which had been taught. Large group instruction assumed an important role in disseminating information both about the rules of the classroom content and and the academic curriculum. In this particular paradigm the teacher-directed large group structure was uniform; that is, the teacher talked to the entire group and called on individual children to give answers, and generally few opportunities were available for children to ask questions or make comments.

Individual practice of academic skills was teacher-structured. The explicit rule during instruction and practice was that children would listen and work quietly by themselves. This rule remained the classroom norm when teacher-directed instruction occurred, but the norm changed during individual practice. Children often talked with other children sitting nearby about task or non-task topics, and oftentimes children discarded their task and worked with another child on an activity. A minor perturbation was for children to work on the task themselves but make task and non-task comments to nearby children. Children interpreted teacher-structured individual child tasks by altering the participant structure to that of a child dyad.

Other task and participant structures were ancilliary to the general teaching-learning paradigm of teacher-directed instruction followed by individual practice. Child-structured activities such as learning centers or outdoor play which provided teaching-learning opportunities for children through the exploration of materials and activities were a minor aspect of the curriculum , and in neither of these child-directed activites did teachers assume a pedagogical role with the children.

The typology and INDSCAL analysis were indicators of how children participated in classroom learning tasks. Although all children preferred activities which they could direct, the achieving children selected and participated in activities much like the individual child practicing structure. For example, when they did table work they either worked alone or made infrequent non-task comments to nearby children. When achieving children had the opportunity to work with other children in learning centers, they typically worked quietly on a task with another

child or they worked alone but sat in close proximity to other children and periodically talked with them. Low-achieving children participated in child-directed activities such that their actions reflected cooperative learning structures. During table work low-achieving children frequently worked with another child on the task. When the teacher heard the background noise of this conversation, she reprimanded the children to work quietly by themselves. During learning centers low-achieving children either worked alone on building or construction tasks or they played in small sociodramatic play groups or cooperative building enterprises. These latter activities caused an increase in the ambient noise level which again prompted the teacher to reprimand these children. Not only did low-achieving children have few opportunities to participate in their preferred learning structures, but when they did work in small cooperative groups, the teacher typically reprimanded this behavior. This offers another explanation for the preoccupation which low-achieving children had for classroom rules and procedures, and provides further evidence for the persistence of cognitive dissonance for low achieving children.

Considering the participant and task structures of the classroom suggests an environmental disjoint for the Hispanic, low income, and low-achieving children. For example, low-achieving children preferred learning tasks which they could structure and direct. These learning events were rarely offered. Further, when this preference difference is coupled with their constructs of rules and procedures, these students seem at-risk for failure in the typical classroom. It may be that some children enter school with a belief about learning which is more compatible with that which occurs within the classroom, and these children more readily adopt the classroom norms. Children who come to school with less compatible views may require more time to become familiar with the rules, and, perhaps more importantly, may require alternative teaching-learning structures. This evidence suggests that a single teaching-learning paradigm may be educationally ineffective for the diverse cultural, economic, and developmental levels of students. These findings suggest adaptations in the conceptual framework originally proposed (Figure 1).

The Development of the Person<->Environment Interaction Model

Cognitive dissonance proved to be a pivotal component in evaluating the inconsistencies in the belief profiles. The beliefs which the children in this study had about learning were influenced by many things, but clearly one of these influences was their participation in the classroom. Although the impact of their participation on what and how they learned in the classroom is not well understood, the distinct differences between achieving and low-achieving children's preferences for participant structure exemplifies that children do not all attend to the same aspects of learning events. Since the learning events which the low-achieving children preferred were those least available in the teaching-learning structure of the classroom, it is probable that a disjoint existed between their beliefs about learning events and the classroom situation. One way to evaluate this disjoint is through the theory of cognitive dissonance.

Cognitive Dissonance

Cognitive dissonance, a theory proposed by Leon Festinger (1957), is simply a psychological tension which has motivational characteristics. At the heart of dissonance are the cognitive elements, that is, information which a person has about him or herself or the surrounding environment. When the cognitive elements are in agreement, then there is cognitive consonance. It is when there is discrepant information, that dissonance occurs. The theory of cognitive dissonance concerns itself with conditions that arouse dissonance and the ways it can be reduced (Brehm & Cohen, 1962). The results of this study suggest that the teaching-learning environment both arouses and reduces cognitive dissonance.

The teaching-learning structure used with the most regularity in the Jones kindergarten was that of teacher-directed large group instruction followed by individual student practice. Learning in a large group directed by the teacher requires children to listen usually without other sensory cues. Practicing academic skills independently requires that children solve the task without consulting with the teacher or other children or using adjunct materials. Such a teaching-learning paradigm is consonant with what the children will most likely experience in first grade (Goodlad, 1983; Jackson, 1968; Sirotnik, 1981) so developing proficiency in this type of instruction may be an enabling factor for successful socialization in first grade. However, sole reliance on this teaching-learning paradigm--listening to the teacher and practicing alone--may neither meet the needs of diverse student groups nor enhance the cognitive development of any of the student groups.

This teaching model suggests an environmental disjoint. A single teaching-learning paradigm may be educationally ineffective for the diverse cultural, economic, and developmental levels of students. Instead, several teaching models may be needed in a single classroom to provide for individual student differences (Hunt, 1975; Joyce & Weil, 1972; Marshall & Weinstein, 1984). Considering the participant and task structure of a classroom it would seem likely that there are optimal developmental and conceptual matches between persons and the environment. Hunt (1975) proposes that maximal classroom learning environments offer several learning structures. He suggests that the conceptual and developmental levels and learning styles of the individuals should dictate the structure of the environment with the goal of schooling to develop independent learners. Other researchers suggest that learning environments can offer several teaching and learning structures to accomodate the needs of most individual students (Joyce & Weil, 1972; Marshall & Weinstein, 1984). Second, children seem to learn more and like school more when they can make choices and have some measure of control over their learning environment (Epstein, 1981, 1983; Moos, in press).

Such teaching models neither suggest nor preclude the pedagogical role of the teacher when learning tasks are structured or directed by children. Consider as an example the development of logico-mathematical skills. Children at concrete and preoperational levels need time to explore a variety of materials to discover concepts of numbers (Ginsberg & Opper, 1978). Such exploration seems best facilitated when children work alone or with other children in play-like settings with the teacher offering feedback and asking questions to facilitate the discovery process (Donmoyer, 1981). Learning centers and small group instruction were vehicles available in the Jones classroom for such learning. However, such learning structures were not only used infrequently but when included in the daily curriculum the teachers did not assume a pedagogical role as evidenced by the fact that the teachers did not circulate among the children during learning centers and contract box activities. Thus, if a child were at a cognitive transition point, the teacher was not available to encourage the child to approach the problem from another perspective.

If learning environments are multiform, then cognitive dissonance may facilitate learning. Sameroff (1975a) presents this argument in terms of a dialectical process when he argues that learning occurs because cognitive

disequilibrium causes children to seek new information. When his views are considered in light of cognitive dissonance, then the tension state created by discordance may be a potent learning force to prompt changes in thinking. If this is the case, then a critical issue for classroom learning environments is to offer participant and task structures which prompt dissonance at the incipient level for cognitive and social development.

The Efficacy of Multimethod-Multitrait Research

The inclusion of several procedures to assess participant beliefs and the classroom situation and the use of multiple analyses were beneficial for several reasons. First, the participants in this study were diverse in their developmental, educational, and demographic characteristics. Using a variety of interview procedures provided ample opportunity for the children and adults to talk about their beliefs and preferences for classroom learning events. Observing the classroom from different vantage points throughout the school year gave a more realistic appraisal of the way in which learning events were actually sequenced and framed in the classroom. The multiple analyses were critical in developing an accurate profile of participant beliefs about learning.

The teacher workplan and the photographic array of the classroom situation suggested that a variety of teacher and child-directed learning tasks were included in the curriculum. Further, it seemed that a variety of participant structures were available to present academic information. The subsequent classroom observations indicated otherwise. Although several task and participant structures were available, only three types of learning activities were used with any frequency. Teacher-directed large group instruction, individual student practice, and outdoor play were the core of the curriculum. The multimethod approach adopted was critical in isolating the primary task and participant structures available in the classroom. If an analysis of the teacher workplan, the photographic array, and the initial classroom observations had been relied on solely to understand the classroom situation, then the primary classroom structure would not have been uncovered. Knowledge of this primary structure was instrumental in learning about the mutual influence between participant beliefs and the classroom situation.

Perhaps one of the most important findings of this research were the inconsistencies in the beliefs of single participant groups. The multimethod, multitrait methodology adopted in this research was instrumental in uncovering these inconsistencies. As an example, the INDSCAL solution indicated that parents

and teachers were closely aligned in the importance which they attributed to learning events, and the learning events which were salient for adults differed markedly from that of the children. The LINMAP analysis indicated a reversal of this pattern in that parents and children had the same preferences for classroom learning events and these preferences were quite different from those of the teachers. The linear regression procedure and the typology offered some explanation for the different results obtained in the two analyses.

The inconsistencies in the parents' beliefs seemed to be the result of conflicting goals. Parents wanted their children to succeed academically and considered teacher-directed instruction and individual student practice as important educational means for school learning. But parents also had social-developmental goals such as learning to work with others and solving problems with peers. These goals were not addressed in the kindergarten curriculum. These inconsistencies or conflicting goals were only discovered through the multiple analysis procedures.

The efficacy of the multimethod, multitrait approach is also evident in examining the various groups of children. The INDSCAL analysis for the achieving and the low-achieving children indicated the value of performing separate INDSCAL analyses for the participant groups. In this comparison a spatial configuration which was very different from that of any of the other groups was found. This configuration indicated that achieving children attended to the learning events most prominent in the classroom; that is, teacher-directed instruction and individual student practice. Low-achieving children attended to learning tasks which they could direct with a partner. If the INDSCAL salience weights had been relied on solely to determine group differences, then the distinct preference patterns found for the achievement groups would not have been uncovered.

The typology was an important tool in interpreting the INDSCAL and LINMAP analyses and the preferences for the pictorial stimuli. The typology underscored differences between the adult and the child groups and served to explain the other analyses. The explanatory value of the typology is evident in the parent belief profile. The INDSCAL analysis indicated that parents attributed importance to the typical classroom structure, just as the teachers did, and the LINMAP analysis contradicted these findings by showing that parents preferred discovery learning activities. The typology shed light on these inconsistencies by indicating that parents considered learning activities in which children could work with other

children to create, construct, and explore as important. The teachers' typological profile did not include these activities nor did it approximate the level of complexity of the parents' typology.

Another value of the typology was the evaluation of the constructs with the pictorial stimuli. This level of analysis indicated distinct differences between participant groups which were not uncovered by examining only the constructs. Further, analyzing the pictorial scenes with the constructs was effective in interpreting the spatial configuration of the INDSCAL analysis. As an example of the usefulness of the typology in uncovering beliefs, the Mexican-American students selected a wide range of pictures to represent both learning play and school tasks; whereas, the Anglo students selected scenes representing academic activities for school tasks and play scenes to represent learning play. Anglo students also were more concerned with teacher-directed activities and teaching-learning outcomes. None of these findings would have been apparent without the typological analysis.

Discussion

The complexity of a classroom learning environment and the many factors which influence interactions and participation during learning events required multi-operational approaches in the study of the classroom milieu (Cook & Campbell, 1979). The person<->environment interaction model proved to be an effective framework to develop the multimethod, multitrait research strategy. The four model components--the classroom situations, participant beliefs, cognitive dissonance, and learning and achievement--were important reference points from the inception of the research to the final appraisal of the model. The theoretical model which guided this research indicated the need for an iterative process to tap the underlying complexity of the classroom learning environment and to accurately represent these events to classroom participants. This iterative process, used in both the methodological and analysis approaches, was instrumental in isolating the distinctive attributes of the classroom learning events and uncovering the beliefs of the divergent groups of children and adults.

Several things were learned through the iterations. The analysis of the teacher workplan, the set of 250 classroom learning events photographs, and observations in the classroom produced pictorial stimuli which proved effective in eliciting the personal constructs of the participants. The variety of interview tasks--sorting, descriptions, ratings, and rankings--offered varying levels of

information regarding the participants' perceptions of classroom learning events. The series of observations in the classroom indicated the task and participant structures available and the primary teaching-learning structure. The range of analyses, including the typology of personal constructs, INDSCAL, LINMAP, and the linear regression of the rating scale on the INDSCAL solution was critical in developing a profile of beliefs for the diverse participant groups.

Multidimensional scaling was a viable adjunct analysis to personal construct elicitation as the configuration of the pictorial stimuli in multidimensional space uncovered patterns in the beliefs of the participants. The multidimensional scaling solution and the typology of personal constructs were interpreted through a dialectical process, in that, the derived INDSCAL dimensions and the personal constructs had enhanced meaning when considered against each other. The assignation of the dimensions was a result of this dialectic, as the dimensions may have been incorrectly interpreted if the typology and dimensions were not evaluated jointly.

In closing, the iterative process used in this study suggests that none of the analyses in and of themselves were sufficient to understand the belief patterns of the participants. Rather multi-operational and analyses strategies were required to uncover the salient aspects of the participants and the classroom situation. Such a research approach seems sensible for further inquiry into effective teaching-learning environments for poor, minority students. Finally, this research gives empirical support for the continued use of the person<->environment interaction model to study individuals interacting and participating in a social environment. It is clear that both multiple operational and analyses procedures employed in this research were critical in uncovering the salient aspects of both the classroom environment and the participant beliefs. Such methodology seems critical when assessing the complex attributes of learning environments for children with diverse learning needs.

The pictorial stimuli used in the interview tasks were completed by Randy Mott of Austin, Texas.

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